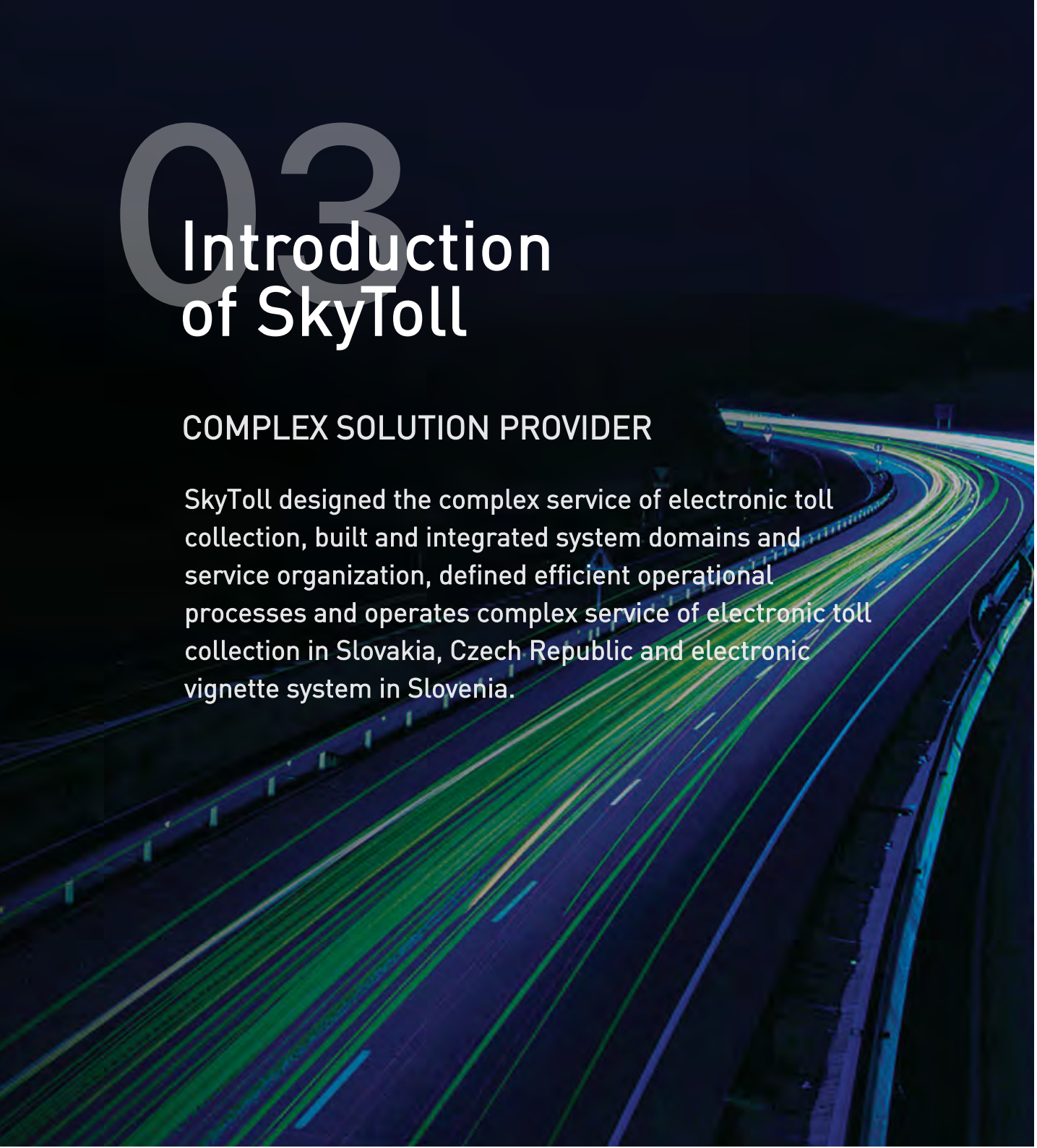
SKYTOLL

Business introduction

Presentation of solutions and services

SKYTOLL



03 Introduction of SkyToll

COMPLEX SOLUTION PROVIDER

SkyToll designed the complex service of electronic toll collection, built and integrated system domains and service organization, defined efficient operational processes and operates complex service of electronic toll collection in Slovakia, Czech Republic and electronic vignette system in Slovenia.

Design

Build

Operate

Maintain

Finance

Innovate

Key milestones in 14 years history

2009

SkyToll wins the tender for the electronic toll system for vehicles >3.5t in Slovakia.

2010

Design, construction and start of the operations of the GNSS - based electronic toll system in the Slovak Republic.

2012

SkyToll completes the redesign and replacement of the system during full operation in 2012

2013

SkyToll extends the Slovakian tolled road network from: ~2,400km up to ~17,800km in 3 months

2015

SkyToll is awarded by IRF Global for the Slovakian toll network expansion.

SkyToll wins the tender for the vehicles <3.5t in Slovakia and launches the eVignette scheme.

Build up advisory services for the Russian tolling system.

2016

Pilot project on electronic monitoring and fee collection for road usage charging in Uruguay.

2018

The consortium of Czech-Toll and SkyToll wins a tender for an electronic collection system in Czech Republic.

2019

Skytoll replaced microwave tolling system by GNSS system in Czech Republic without interuption of operation.

2020

Pilot testing of Regional interoperability among Toll chargers Germany / Czech Republic / Slovakia.

2021

Provisioned of MLFF platform and OBUs for Toll service providers in POLAND.

Launch of electronic vignette system in SLOVENIA.

2022

SkyToll became a part of ITIS Holding a.s.

2023

SkyToll succeeded in a tender of Austrian toll system and electronic vignette system operator ASFINAG to supply a mobile system for electronic vignette payment enforcement

05 Project references

		TOLL ROAD CATEGORIES	TOLL NETWORK	PERIOD OF OPERATION
Slovakia Design, development, funding, operation and maintenance of a complex electronic toll collection service	A combination of satellite GNSS/GPS technology, GSM/GPRS technology and microwave (DRSC) technology	Motorways, expressways, first, second, and third-class roads	17 611,2 km *	13 Years
Czechia Design, development, funding, operation and maintenance of a complex electronic toll collection service	A combination of satellite GNSS/GPS technology, GSM/GPRS technology and microwave (DRSC) technology	Motorways, expressways and first class roads	2 866 km	10 Years
Slovakia The service of electronic collection and records of payments for motorway vignettes for the use of the specified road sections	Video Tolling / Time based	Motorways and expressways	752 km	5+3 Years
Slovenia Electronic vignettes system delivery and its IT operation	Video Tolling / Time based	Motorways and expressways	618 km	5+3 Years
Russia Design of Electronic Toll Collection	Combination of satellite GNSS/GPS, GLONASS, GSM/GPRS technology	Federal roads	50 000 km	
Uruguay Pilot for Electronic Monitoring and Roach charging system as a part of consulting services	A combination of satellite GNSS/GPS, GSM/GPRS and microwave (RFID) technology + Video tolling	Primary, secondary, tertiary roads	8 200 km	

* as of 1 January 2023: 8,242.314 km

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Solution and services

Advisory services

Based on its ground experience, SkyToll offers advisory services for every key stage of an ETC system creation:

- **Complex business and integrated Design**
- **System build-up and set up SLA parameters**
- Organization build up and set up business processes
- Replacement of the ETC systems without affecting toll collection
- **ETC and ITS Systems integration** (Payment systems, State registers, Enforcement systems, Telematics systems, Accounting systems, Integration with toll service providers)
- Complex test campaigns
- Launch and operation support

Road usage charging

Thanks to a strong experience in ITS systems, SkyToll has a solid ETC product portfolio:

- Technology agnostic ETC system back-office suitable for GNSS (Satellite based) ANPR (Video based) schemes
- eVignette system (electronic time based)
- **Enforcement and monitoring system**
- **Automatic incident detection solutions**
- OBU provisioning
- OBU Smartphone app with support of DSRC tag
- Business intelligence

ETC scheme operation

SkyToll is able to manage the commercial and technological operations of an ETC scheme:

- Operational organization management
- Management of the system
- **Maintenance of the infrastructure and back-office**
- Continuous technology innovation
- **Technical support**
- **Customer support**
- **Commercial operations** (Front office, Back Office, Enforcement Back office)
- Service provision
- Data analysis
- Stakeholders relationship management

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Business Areas

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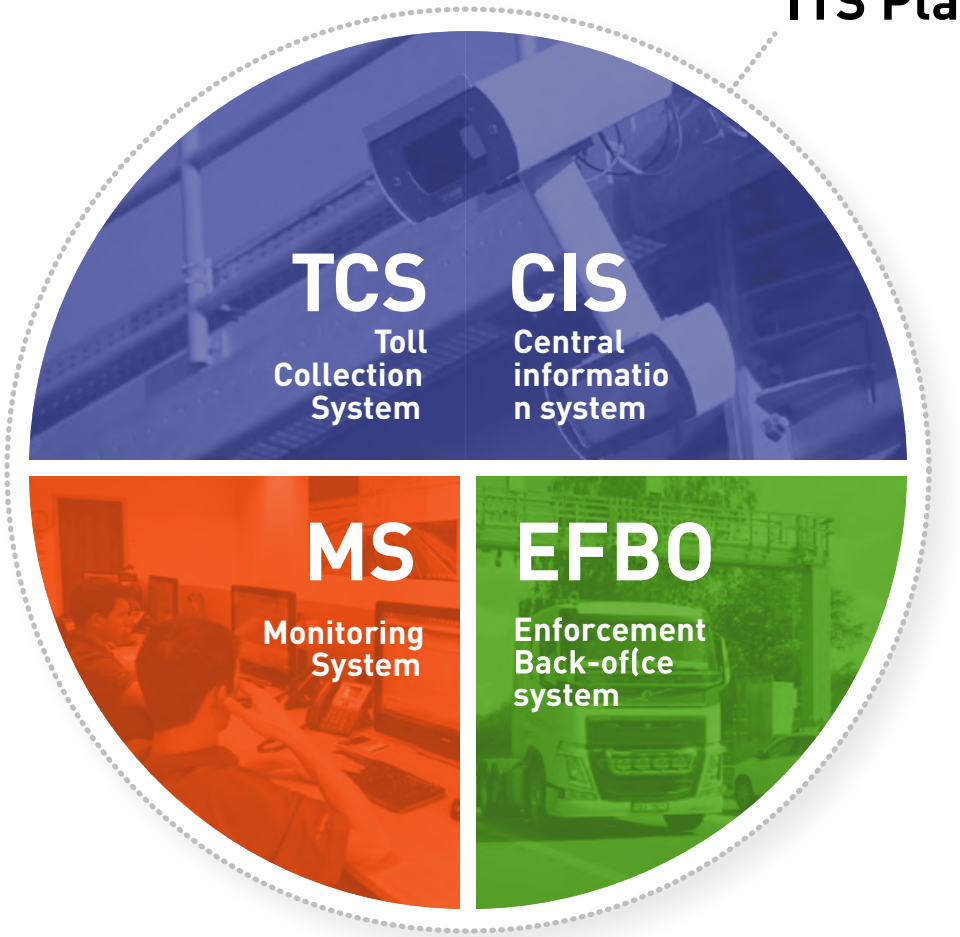
ITS Platform



Toll Collection

- Satellite based toll collection (OBU)
- Video based toll collection (ANPR)
- DSRC/RFID toll collection

Traffic Monitoring

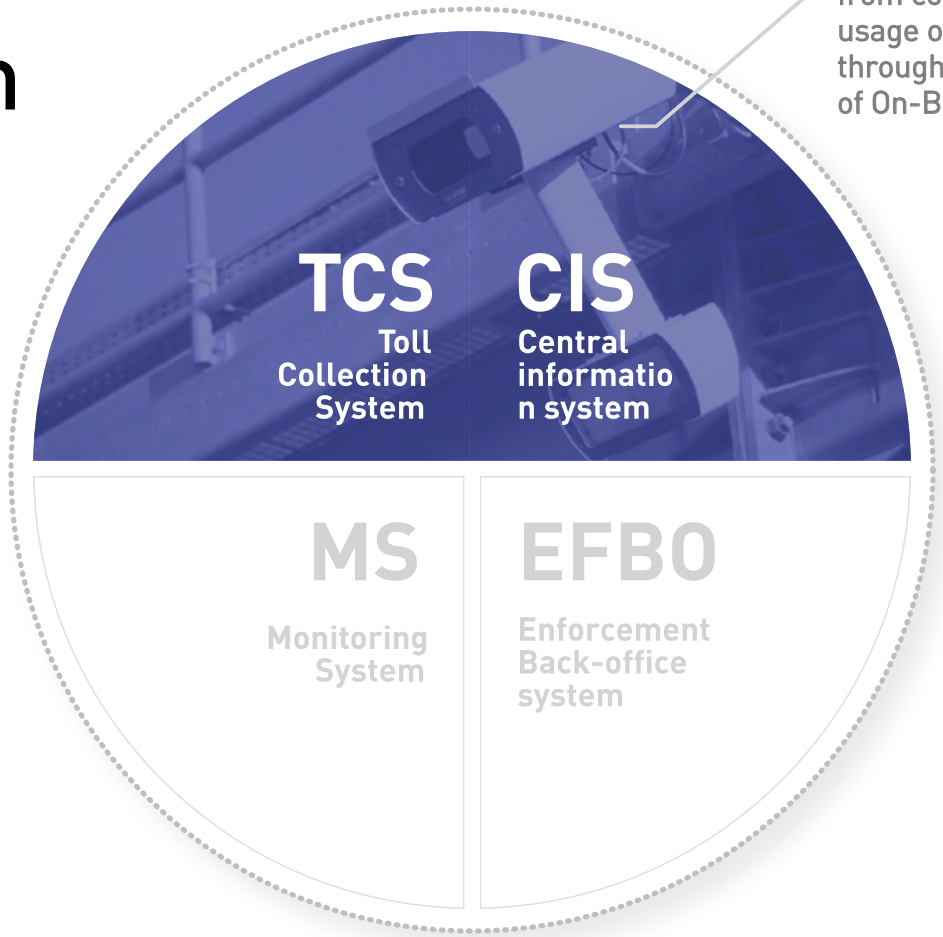
- Real Time Monitoring
- Traffic Engineering Monitoring
- Detection of Traffic Rule Violations
- Transport Surveillance
- Automatic Incident detection
- Data Analysis
- Reporting

Enforcement

- Stationary gantries
- Weight in motion
- Mobile enforcement vehicles
- Speed enforcement
- Machine learning
- Manual processing

08 Toll Collection

Management of all activities starting from collection of information about usage of toll roads, customer care through rating and billing up to logistics of On-Board Units.



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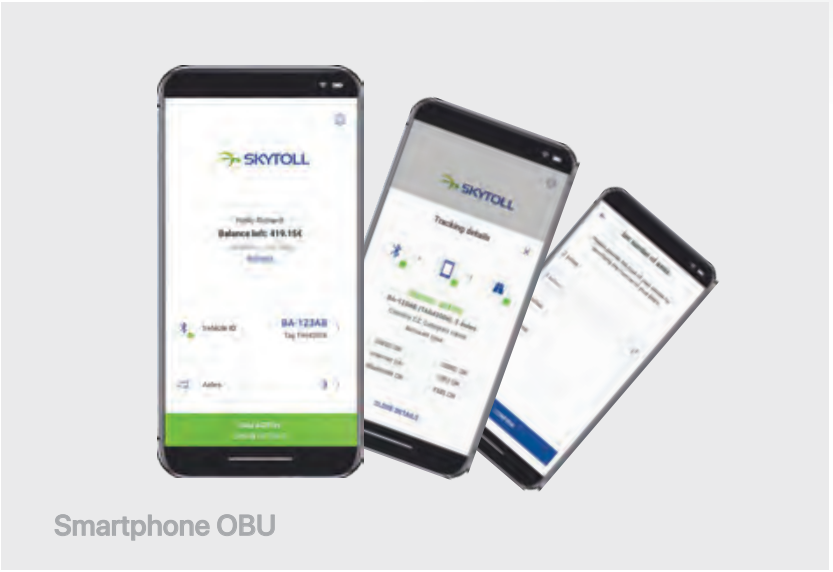
Satellite based solutions (GNSS)

MLFF System is based on GNSS technology. Toll collection is **performed on GNSS basis** with the supplementary utilisation of the Route Tickets. Enforcement will use the **ANPR technology (in optional combination with DSRC).**



Smartphone OBU

On-Board Unit

All objectives of the solution expect that the application of the GNSS technology will allow toll collection and enforcement in **free traffic flow in multiple lanes** with no need to change the speed or the direction of driving vehicle.

Utilisation of the GNSS technology will enable the flexibility of system extensions enabling to implement new requirements regarding toll collection without necessity of building a time and cost-demanding infrastructure

The on-board unit is a key component of the Electronic Toll Collection System (It is possible to use Smartphone OBU). The installation of OBU shall be simple allowing it to be performed by vehicle drivers.

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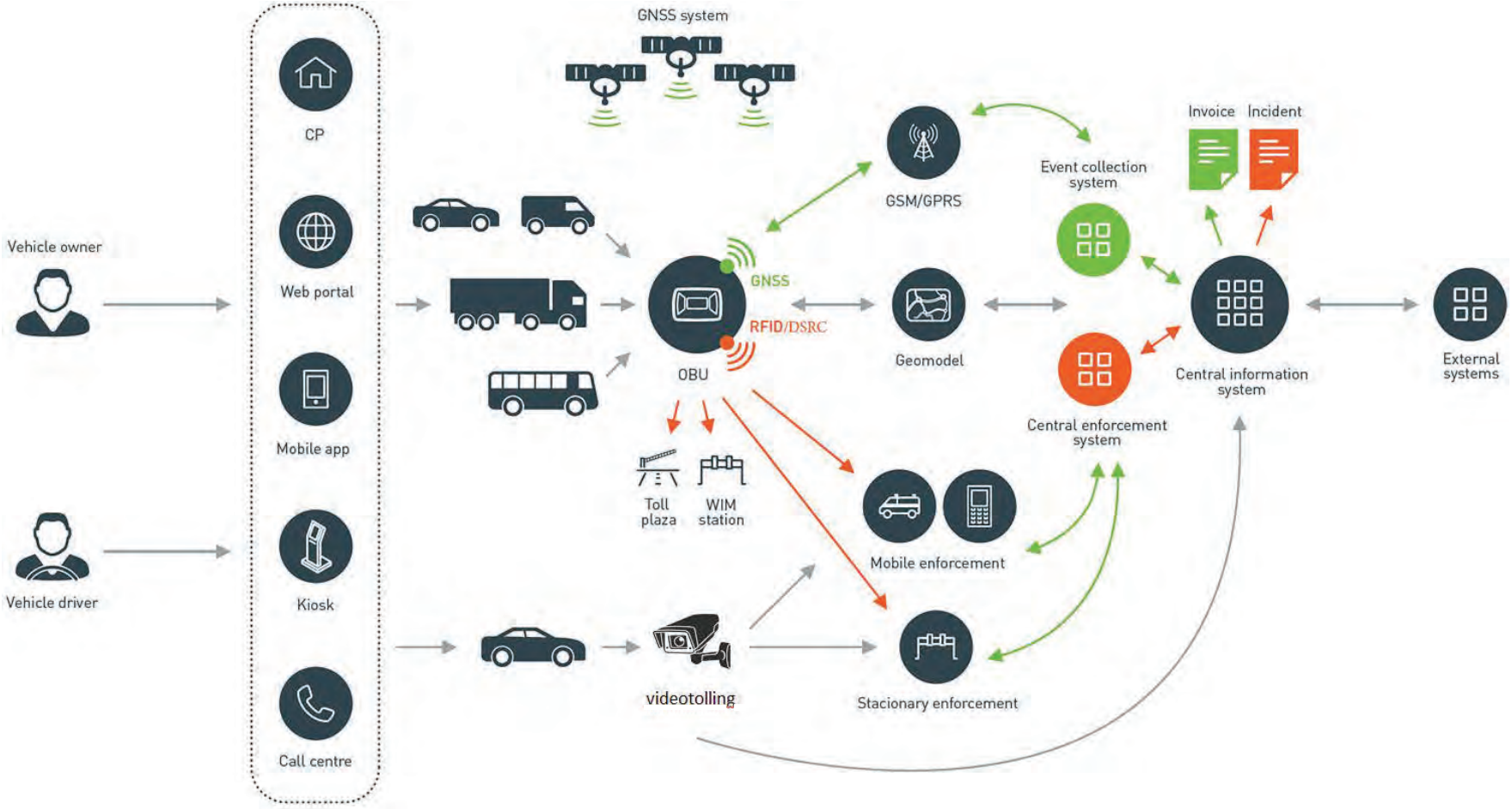
ETC Components



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Aim of the Pilot project

Considering the complex project and operation of the system of electronic toll collection for the purpose of compensating damages caused by commercial vehicles on the highways and trunk roads and monitoring of primary, eventually also secondary, roads we believe that early delivery of know how is one of the most important factors of the project (https://youtu.be/ngU7pB84tFA).

Scan me!

¡Escanéame!

As the technology for satellite based Electronic Toll Collection System is unique and the finally chosen system will affect a huge number of road users for a long time, we offer to provide a Pilot project to enable the stakeholders to evaluate the advantages of our system with minimal costs.

The goal of the Pilot project is to demonstrate the flexibility of the satellite based Electronic Toll Collection System and the speed at which it can be built, before decision about future technology will be taken.

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Video tolling (ANPR)

Form of electronic toll collection, which uses video or still images of a vehicle's license plate to identify a vehicle liable to pay a road toll.

The system dispenses with collection of road tolls using road-side cash or payment card methods and may be used in conjunction with "all electronic" open road tolling, to allow drivers without an electronic device to use the toll road.

Provision of a charging service according to identified LPN.

Provision of Customer and Billing services.

Video Tolling technology can be used for Time based tolling as well (sol called Electronic vignettes where ANPR is being used only for the purpose of enforcement)

Front number plate

CA 7890 BT

Country code

EU-BULGARIA

Lenght	Hight	Width
1400 cm	430 cm	250 cm

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Video tolling variatons

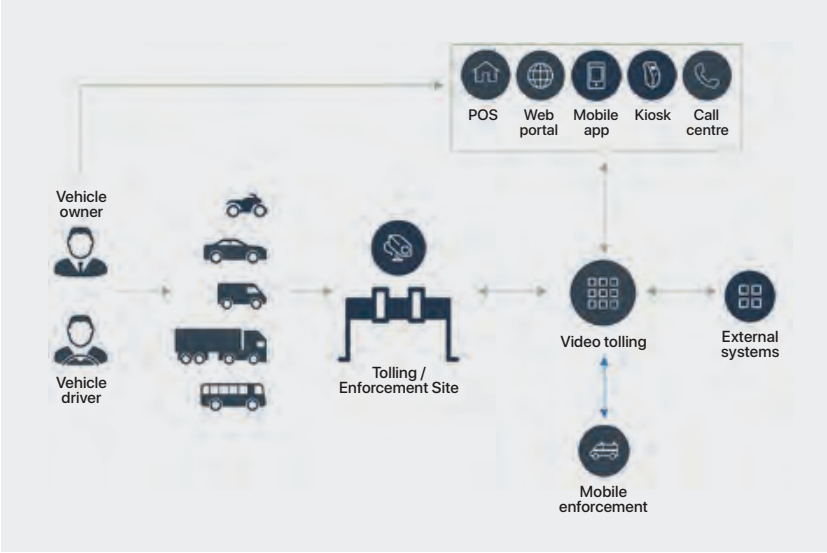
Road Tolling / Tunnel Charging

has multiple variations of the charging:

- Journey based
- Multiple Journey based
- Distance/ Sections based
- Time based (Day, Week, 10 days, 1 month, 365 Days and others which are subject of configuration)

Sales Channels

- Point Of Sales
- Web SelfCare
- Mobile application
- Kiosk Device
- Integration with 3rd parties (Petrol stations, Post...)
- Purchase by QR code



Open mode

Gantries are located at the entries to toll sections, while the type of gantry takes into account the technical parameters of the road, including te number of lanes for which it is necessary to record vehicle passages.

Closed mode

Gantries are located at all entry and exit points (roads, intersections) of a toll area. After recording the entry and exit points, the system evaluates the route and creates a vehicle passage with the appropriate parameters needed for further processing.

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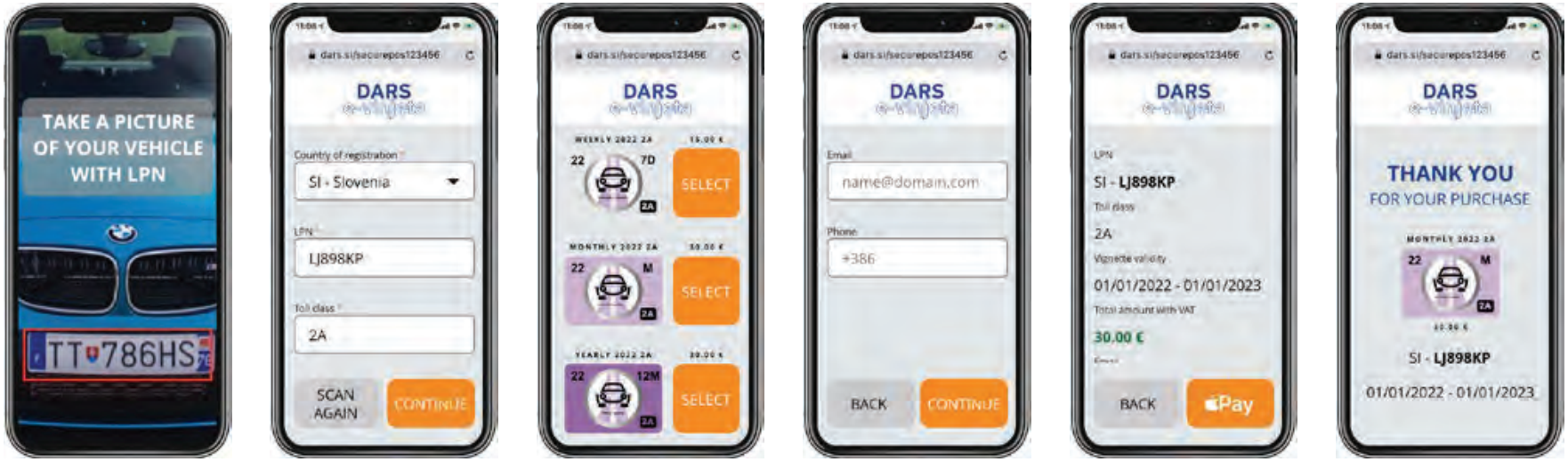
Purchase by QR

Vehicle Vignette Contact Payment

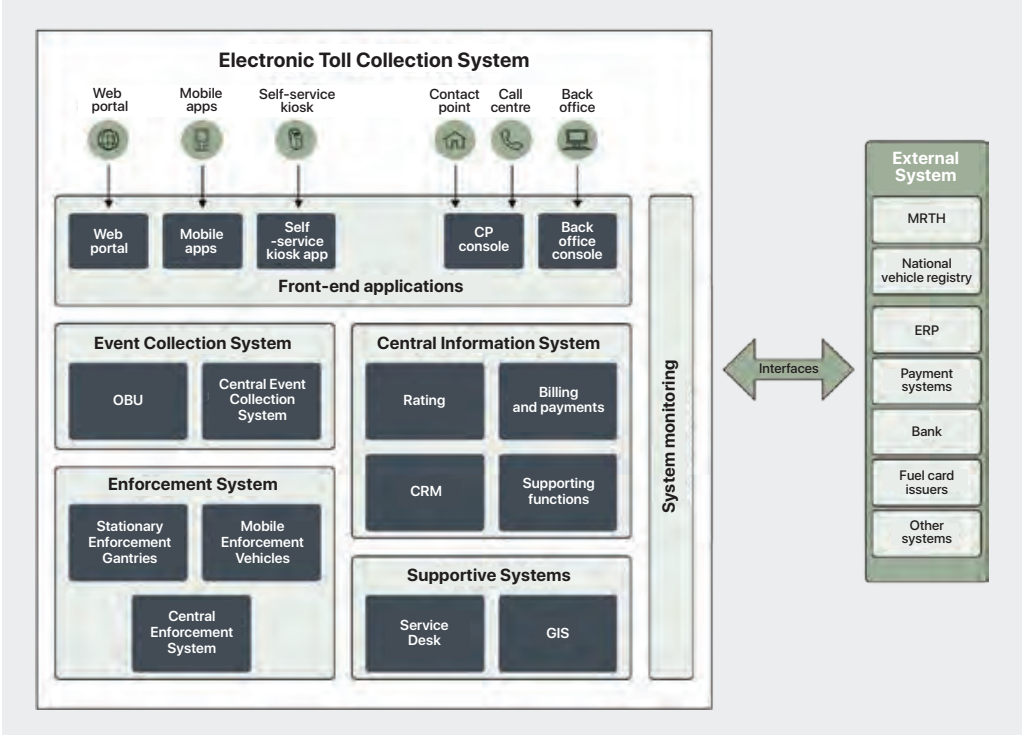


The Central Information System

The Central Information System ranks among systems supporting business activities (Business Support System – BSS); the system is optimized for companies specialized in subjecting road users to fees.

Functionally, it will cover all necessary activities, beginning with customer care, through charging of the toll road usage, payment processing, Route Tickets issuing and ending with clearing and settlement.

The Central Information System will conduct quality assurance procedures and data consistency verification for toll collection and settlement during both data reception and data processing.



From the viewpoint of business processes, the Central Information System will cover business and operational activities of a subject operating and administering toll services, including the functions of a toll charger.

System is regularly divided into following functional domains:

- CRM
- Toll Collection (Rating)
- Payments and Clearing
- (Billing) Supportive Domain

Enforcement System

Toll Collection

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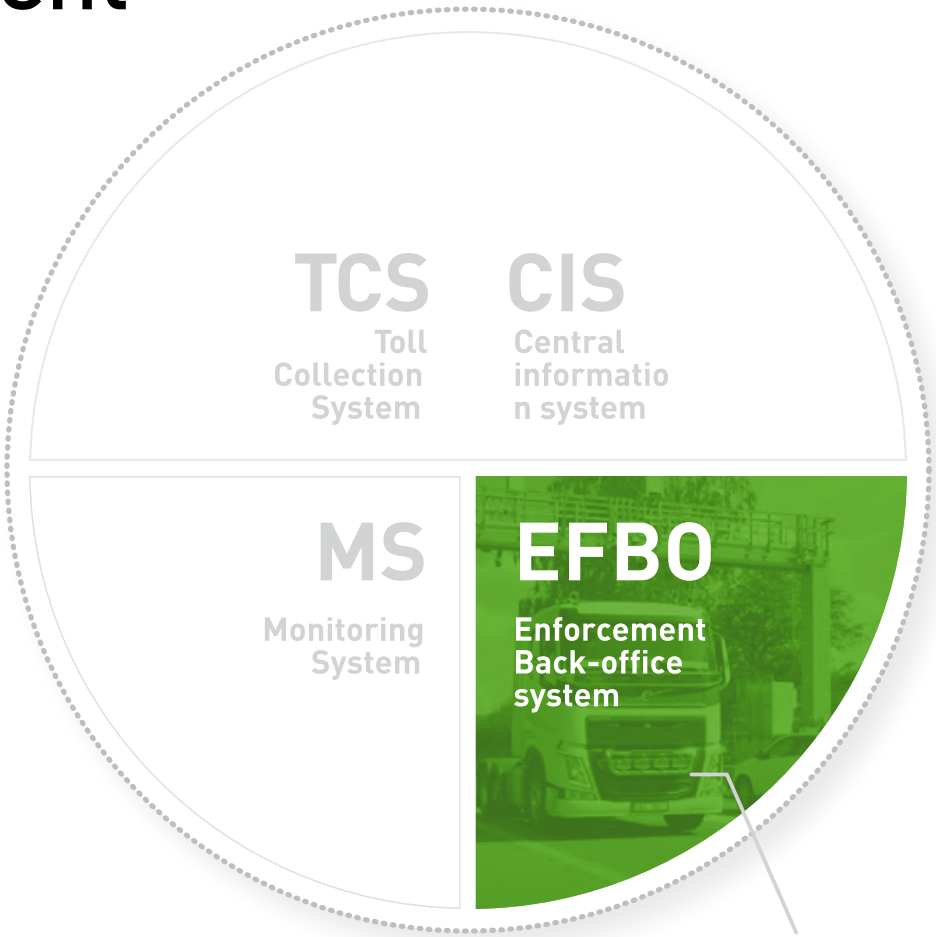

The Enforcement Back-Office (EFBO) receives records from all control gantries and MEVs and automatically processes them by several processes. Records, which automatic evaluation was not completed, are forwarded to manual processing.

Enforcement

- Stationary gantries
- Weight in motion
- Mobile enforcement vehicles
- Speed enforcement
- Machine learning
- Manual processing

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Enforcement System

The Enforcement System will ensure usage data collection and subsequent check of compliance with obligations linked with toll collection. Usage data are data about real usage of the toll road network captured by enforcement equipment, i.e. pictures and classification data about all vehicles passed by the enforcement gantries and mobile enforcement vehicles.

The Enforcement System is composed of the following devices and systems:

Enforcement gantries
Stationary devices that are permanently placed at one checkpoint. They will be used at places with highest traffic concentration. Gantries use cameras and components for vehicle categorisation for the verification of technical parameters of a vehicle (licence plate, vehicle category and the number of axles).

Mobile enforcement vehicles
Mobile enforcement vehicles will be equipped with mobile enforcement devices, which are designed with regard to required functioning in any environmental and technical conditions of the vehicle. At hardware level, enforcement functions are supported by ANPR camera with integrated illumination installed at a roof unit mounted on a roof rack.

Central Enforcement System
The Central Enforcement System will be a system that gather, process and assess data from enforcement gantries and mobile enforcement vehicles as the enforcement parts of the MLFF System. It will be one of the main elements of violators' identification and it will be also used for the reporting of these violators to the competent bodies.

Enforcement System

- Automatic Number Plate Recognition including Country of registration
- Images from cameras including Date and time Stamp
- Identification of the vehicle category
- Identification of the vehicle manufacturer, model and colour
- Identification of the number of Axles
- Identification of the vehicle dimensions and 3D model using laser scanners
- Identification of the direction of driving
- Weight measurements using dynamic weight in motion
- Certified Speed measurement using certified radars

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Weight in motion

Weighing in motion for direct penalties improves road safety and protects against premature degradation of road infra-structure due to overloading of heavy commercial vehicles.

Weigh-in-Motion (WIM) requires installation of several (the more the better weighing accuracy) inductive loops and weighing sensors directly into the road surface. Moreover there are some requirements on the road surface quality, and regular checks and recalibrations (can be automated) are also needed.

Although the price of the system, including the installation and maintenance expenses, is relatively high it was proven that the payback period is less than one year. There are basically two principles – widely used piezoelectric and minor optoelectric (exploiting the measurable deformation of optical fibers installed in the road surface). Skytoll's AID exploits the mature piezoelectric principle based best-in-class technology. There can be various configurations installed depending on the target application.

The measurement of weight load can be done per wheel, axle and overall vehicle (gross) without any traffic flow disturbances (i.e. at normal travelling speeds).

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Proactive monitoring system that helps to control traffic infractions, avoid traffic accidents, proactively detect potentially dangerous drivers, and predict or estimate traffic conditions based on historical data.

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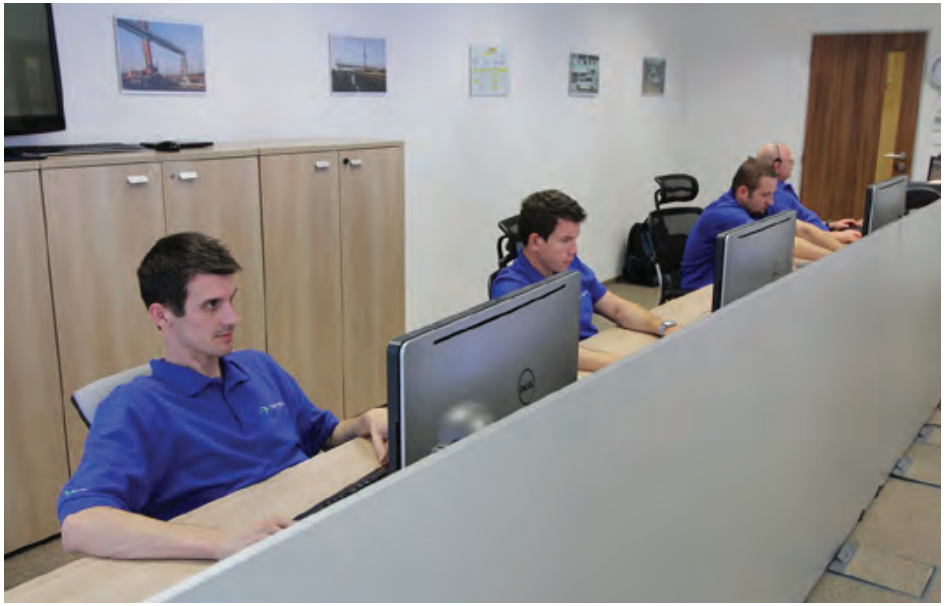
Traffic monitoring areas

Overall system is a valuable source of data, not only about customer data, but especially engineering data that can be collected and evaluated from various areas using the latest technology:

Traffic monitoring using all ITS platform data

- Real-time monitoring of the road network
- Providing data for traffic engineering
- Identifying traffic rule violations
- Transport surveillance
- **Automatic traffic incident detection**



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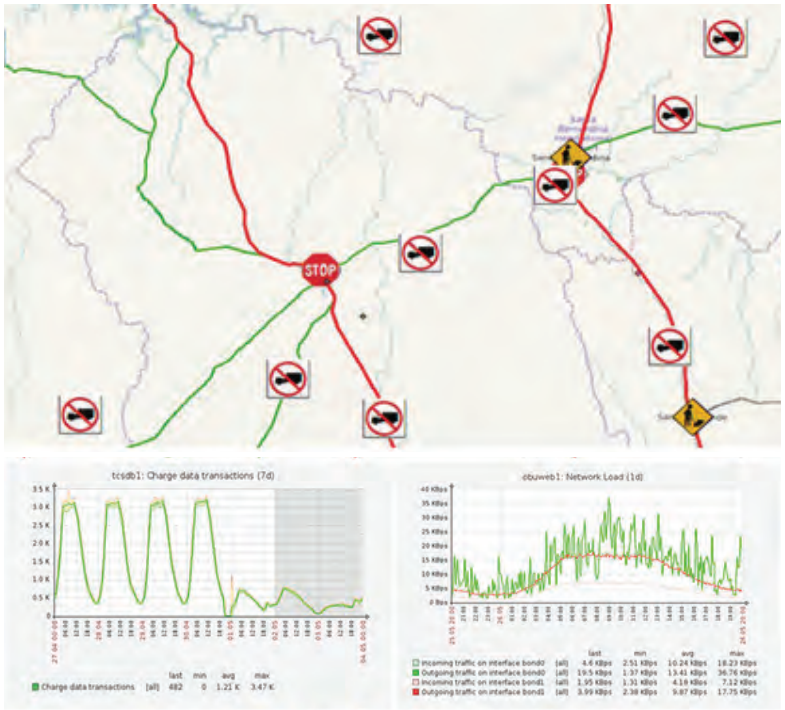
Traffic monitoring areas



Detection of Traffic Rule Violations

- Speed / weight limit violations
- Driving time / rest periods
- Road user restrictions
- VAT fraud identification / Cabotage rule violations

Traffic Engineering Data

- Predict Traffic flow
- Effective inputs for building new roads
- Effective incident response and traffic management
- Provision of evidence to support incident investigation

Real Time Monitoring

- Traffic counting and traffic intensities, Passenger counting
- Traffic jams caused by accidents
- Reduced visibility, Detours, alternate routes
- Lane closure caused by road construction

Transport Surveillance

- Monitoring of oversized and dangerous goods vehicles
- Identification of illegal forms of transport
- Identification of illegal carousel transport
- Identification traffic incidents

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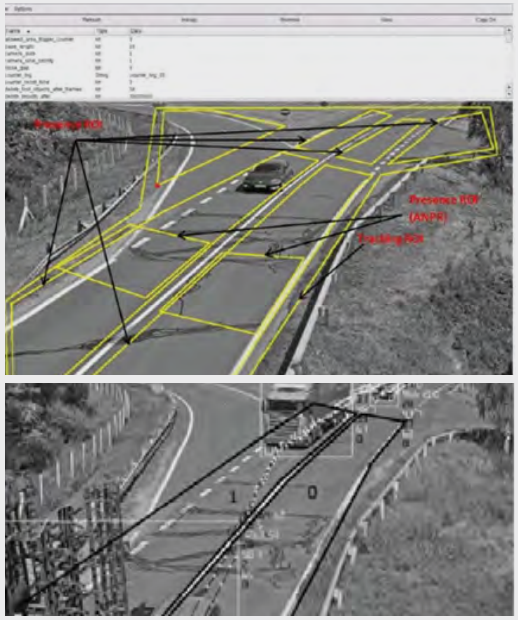
Automatic Incident detection



Technology used for the traffic monitoring became mature enough and affordable so that the wide deployment is possible recent years. The core capability of the Automatic Incident Detection (AID) System is to combine information from the exploited equipment to produce impeachable evidence of the detected incident at the output.

It also implies that the system is closely related to laws in the target country. The system is then able to substantially reduce the number of most dangerous traffic rules violations.

Traffic rules infringements made by drivers are fined using the automated system, which produces and sends a printed (hard copy) documentation of the driving offence to car owner's mailbox.

- MOTION TRACKING & ANALYSIS
- SPEED MEASUREMENT
- OVERWEIGHT
- STOP SIGN CROSSING
- RED LIGHT VIOLATION
- WRONG WAY OR REVERSING
- NO STOPPING SIGN CHECK
- WRONG WAY OR REVERSING
- U TURN AND FORBIDDEN TURN CROSSING
- SOLID LINE CROSSING
- RAILROAD CROSSING
- FORBIDDEN HEAVY WEIGHT VEHICLES SIGN CROSSING
- HIGH AND LOW SPEED MONITORING
- LOW EMISSION ZONE

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